



DRAFT Basis of Preliminary Estimate for Dredging of PCB Contaminated Sediments from Portage Creek, Kalamazoo, MI

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Purpose

The United States Environmental Protection Agency (USEPA) requested that CH2M HILL provide a Class 4 cost estimate for remediation of the section of Portage Creek from Alcott Street to the confluence of the Kalamazoo River in Kalamazoo, Michigan. The purpose of this estimate is to provide a Class 4 rough-order-of-magnitude (ROM) evaluation of costs to perform removal of polychlorinated biphenyl (PCB) contaminated sediments at a range of removal levels including 80, 40, 20, 10 and 5 parts per million (ppm).

Project Description

In 2009, the Millennium LLC performed soil and sediment coring of the section of Portage Creek extending from Alcott St. to the confluence with the Kalamazoo River. Data from the 2009 sampling was analyzed and reported in "Portage Creek Estimation of Volume of Contaminated Sediment and PCB Mass from 2009 Sediment Sampling", Field Environmental Decision Support (FIELDS), June 4, 2010. This report provided computer generated plan views depicting contaminated segments of Portage Creek by PCB concentration in the sediment at 80, 40, 20, 10, 5 and 1 ppm.

USEPA requested CH2M HILL provide a Class 4 cost estimate utilizing the volumes generated by the FIELDS Group. A Class 4 estimate is identified by the American Association of Cost Engineers C18R-97 as generally a study or feasibility cost estimate completed with 1% to 15% of the design information and has an expected level of accuracy of -30% to +50%.

The following activities were included in the development of the cost estimate:

- Design
- Project management
- Access agreement negotiation
- Permitting
- Field engineering
- Construction management
- Data management
- Dredging, stabilization and disposal of contaminated sediment
- Collection and management of free water generated during mechanical dredging and
- Site restoration

The estimate has been developed to provide the USEPA with preliminary costs in current dollars (2010), since the specific time frame and methodology have not been determined. (Table 1)

TABLE 1
Class 4 Cost Estimate

	80 ppm PCB Removed	40 ppm PCB Removed	20 ppm PCB Removed	10 ppm PCB Removed	5 ppm PCB Removed
Estimated Cost	\$1,000,000	\$2,700,000	\$4,600,000	\$5,800,000	\$7,500,000
+50%	\$1,500,000	\$4,000,000	\$6,900,000	\$8,600,000	\$11,000,000
-30%	\$700,000	\$1,900,000	\$3,200,000	\$4,00,000	\$5,200,000

Cost Estimate Methodology

This estimate is based on the following general assumptions:

1. Mechanical dredging of all sediments to load transfer areas. These areas will consist of water tight mixing boxes located within contained lined areas.
2. Free water removal and solidification of sediments in the load transfer area to pass the paint filter test
3. Access (easement) agreements can be obtained for mechanical dredging of all contaminated sediments
4. Protected and endangered species are not present or can relocated if they are disturbed by the dredging activities
5. Turbidity control is based on installation of a silt curtain downstream of the active dredging area and utilization of an excavator equipped with an environmental bucket. Turbidity monitoring performed upstream and downstream during active dredging operations. Assumed standard background plus 30 ntu.

In addition, the following notes apply to the estimate:

- **Technical Tasks** – Design, project management, permitting, field engineering, construction management, data management, and in-situ characterization were all

estimated using parametric multipliers. This estimating technique uses a statistical relationship between historical data and other variables (i.e., site conditions) to calculate an estimate for activity parameters, such as scope, cost, budget, and duration.

- **Quantities** – Quantity take-offs for volume of sediment removal were calculated based on the Figures 2 a/b, 3 a/b, 4 a/b, 5 a/b and 6 a/b provided in the FIELDS report. These figures depict plan views only and were hand scaled for estimating purposes. Key volumes and quantity assumptions are shown in Attachment C, Data Assumptions. Estimated quantities reflect an over dredge allowance of 6 inches. Volume to mass conversion was performed based on an assumed density conversion of 1.5 tons/cubic yard of sediment. No quantity estimate was prepared for removal of less than 5 ppm PCB contamination.
- **Costs** – Construction cost was estimated by generating "Estimated Unit Prices" for various tasks that are anticipated to occur during dredging. Appropriate counts and calculated amounts were applied to those unit price estimates for each PCB removal level specified. Design, engineering, project management and construction management costs are based on parametric methods. The estimated costs include a 15% contingency to account for unidentified elements of the scope of work. The tasks for which Unit Prices were estimated are presented in Table 2.
- **Transportation and Disposal** of sediments with PCB concentrations above 40 ppm were assumed at EQ (Wayne Disposal) located in Bellevue, Michigan. Disposal of sediments with PCB concentrations less than 40 ppm were assumed at Republic Services KL Subtitle D landfill located in Kalamazoo, Michigan. Waste characterization data was not available for preparation of the estimate.
- **Estimated Unit Prices** were developed by building up crews for the activities and setting nominal production rates based on estimator experience. Prices for transportation and disposal were estimated from preliminary vendor cost information.
- **Site Restoration** pricing is based on a potential approach of tree planting and sod installation in all areas disturbed by the dredging.
- **Allowances** – Contingency for area difficulty, yet undefined scope or unforeseen site conditions, project management, remedial design and construction management have been included in the estimate summary as parametric multipliers.

In addition to generating an estimate for mechanical dredging, CH2M HILL also reviewed general costs for hydraulic dredging with sediment dewatering and water treatment. This approach may be competitive for removal of 10 ppm PCB or lower concentrations. Potential non-cost related drivers to choose hydraulic dredging: inability to obtain access agreements, water treatment systems set-up location and/or the preservation of the Creek banks. If desired, CH2M HILL will develop estimated costs for this approach.

TABLE 2
Unit Cost Tasks

ID	DESCRIPTION	COMMENTS
1a	WORK PLAN	General cost level based on CH2M HILL experience
1b	HEALTH & SAFETY PLAN	General cost level based on CH2M HILL experience
1c	ACTIVITY HAZARD ANALYSIS	General cost level based on CH2M HILL experience
1d	SAMPLING AND ANALYSIS PLAN	General cost level based on CH2M HILL experience
1e	QA/QC PLAN	General cost level based on CH2M HILL experience
G01	MOBILIZE DREDGING SUB TO FIRST AREA	Assumes cost for initial mob of all equipment to an area
G02	CLEARING CREW COST	Cost for clearing and tree/brush removal for perpendicular dredging access
G03	MECHANICAL DREDGING CREW	Cost for sediment removal based on 150 cy/day production
G04	SOLIDIFICATION COSTS	Cost for sediment solidification in mix boxes located in the dredging area with superabsorbent polymer/Portland cement blend based on 150 cy/day production
G05	BRIDGE CLEARING RESOURCES	Cost for sediment removal with modified horizontal drill equipment based on 50 cy/day production
G06	WATER HANDLING CREW	Cost for sediment free water removal based on 10% of environmental bucket capacity production
G07	SURVEYING CREW	Estimated cost for daily bathymetric survey crew to confirm existing sediment cut lines and removal depths
G08	STREAM RESTORATION COST	Assumes 10 trees/100 ft and sod installation over disturbed areas
G09	MOT COST	Based on visual counts of areas where Maintenance of Traffic may be required
G10	MONITORING RESOURCES COST	Assumed cost for daily air and water quality monitoring
G11	T&D COST (TSCA)	Assumed for T&D at EQ, Belleview, MI
G12	T&D Cost (non-TSCA)	Assumed Republic Services, Kalamazoo, MI
G13	REMOB TO NEW AREA COST	Cost to shift the dredging operation over a street
G14	ACCESS AGREEMENT NEGOTIATION	Based on counts of potential access agreements required. No list was provided so these counts are best guess
G15	T&D/WATER TREATMENT OF FREE WATER	Cost for T&D of free water collected in load transfer tanks
G16	SHIFT DREDGING EQUIPMENT	Cost to shift the dredging operation 100 ft

Exclusions

- Removal and replacement of outfall and other piping structures could not be estimated based on the currently available information and therefore such costs are assumed to be accounted for in the contingency cost allowance.
- Costs for payment and performance bonds have not been included.
- Costs have not been escalated for out year construction implementation (beyond 2010)
- ➔ • No backfill or stream bed covering/capping has been included in the ROM cost.
- ➔ • No relocation or replacement of utilities located within Portage Creek dredging zones.
- ➔ • Costs for negotiation with Railroads and excavation under railroad structures have been included. However, these costs are subject to significant change and/or the work being excluded from the scope.
- Traffic management beyond site exit as defined above or local permitting requirements yet undefined.
- ➔ • Removal of stumps and root systems from stream banks were not included.

General Notes

The estimates contained in this report have been produced using one or more of the following methods:

- Comparison with similar work performed by contractors, with material and labor adjustments based on observed or perceived site conditions and/or on information provided by local engineers or operators of the facilities that have been surveyed
- Facility cost/capacity ratios, with adjustments for site conditions
- Ratio methods, using known material/equipment costs as guides

Only the basic parameters for performing the work have been determined; final methodology will impact the ultimate cost for project execution. Based on the Class 4 estimate classification, expected final methodology cost will be within the plus 50% to minus 30% of the ROM estimate cost.

Detailed cost estimates (Class 3) can only be developed by performing sufficient engineering and design to define the scope for discrete projects. Once detailed designs are developed, then detailed engineer's estimates can be performed and bid specification packages can be put out for competitive bidding.

The purpose of these estimates is to assist in establishing priorities for decision-making and to aid in evaluating the potential cost of performing the tasks identified. These estimates cannot be relied upon to establish funding levels for individual tasks, as neither preliminary nor detailed design engineering has been performed in sufficient detail to provide sediment

quantities, TSCA/Non-TSCA contamination and/or sediment characterization from which to develop budget funding estimate (AACE Class 3). Soils reports and other environmental information have not been available.

Therefore, caution should be used in utilizing these rough order of magnitude numbers for anything other than preliminary evaluation and planning purposes. Once the priorities have been established, the traditional engineering, procurement and construction process of design, bid and build can be followed.

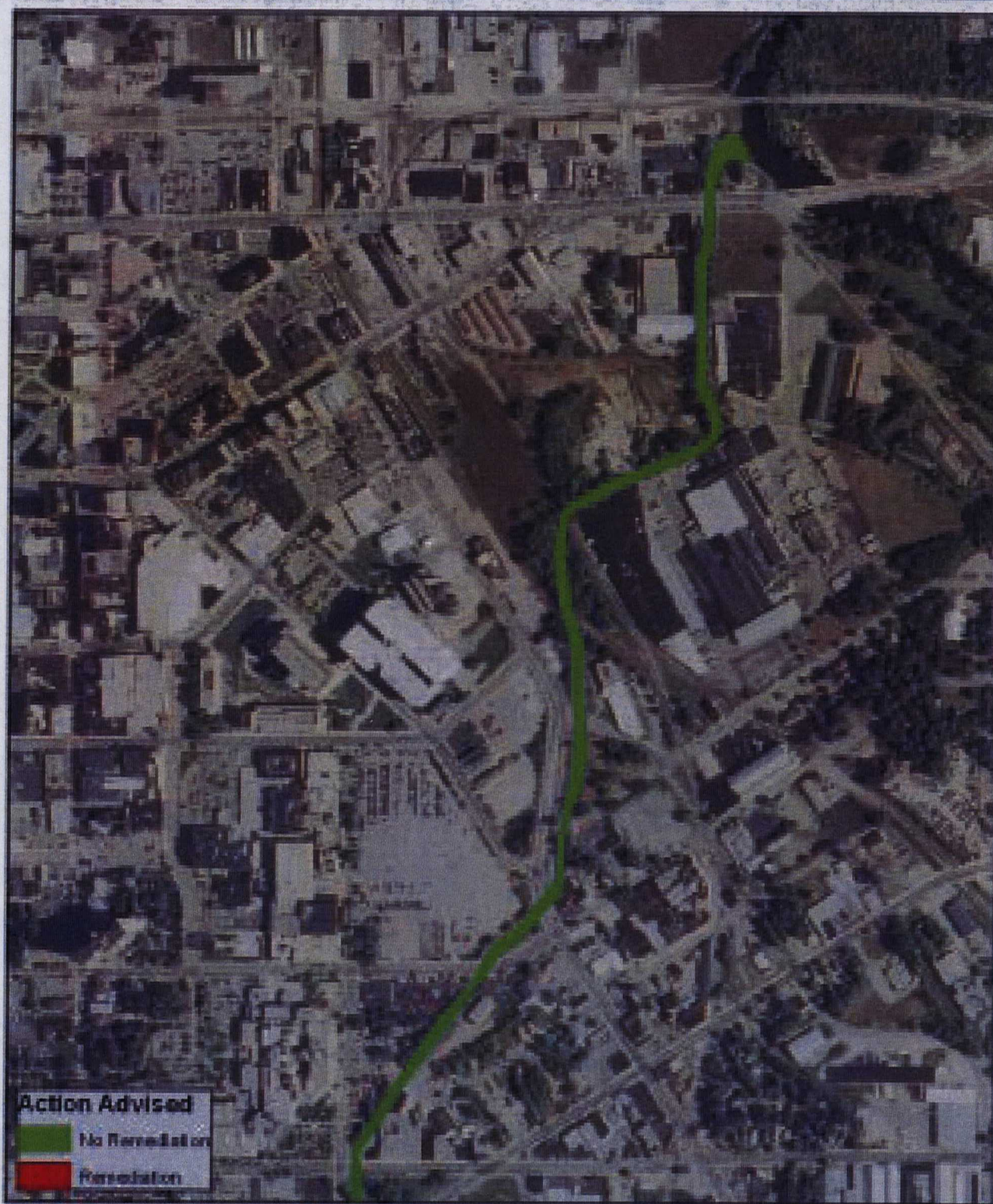
Attachment A
Applicable Drawings

PORTAGE CREEK DREDGING

DRAWING NOTES

Kalamazoo River: Portage Creek North
80 ppm Block Based Cleanup

Kalamazoo, MI
June 2010



GIN 2006 MVE 1042 00
Data Source: USGS / USEPA / ARCADIS
JRM / Jansen Corp
Map Author: Mike Wojcik



Figure 2a. Remediation areas for 80 ppm clean-up

Kalamazoo River: Portage Creek South
80 ppm Block Based Cleanup

Kalamazoo, MI
June 2010



UTM Zone 18N, NAD 83
Data Source: USGS / USFWS / ARCADIS
Project: Kalamazoo River
Map Author: Mike Meyer



Figure 2b. Remediation areas for 80 ppm clean-up

Kalamazoo River: Portage Creek North 40 ppm Block Based Cleanup

Kalamazoo, MI
June 2010

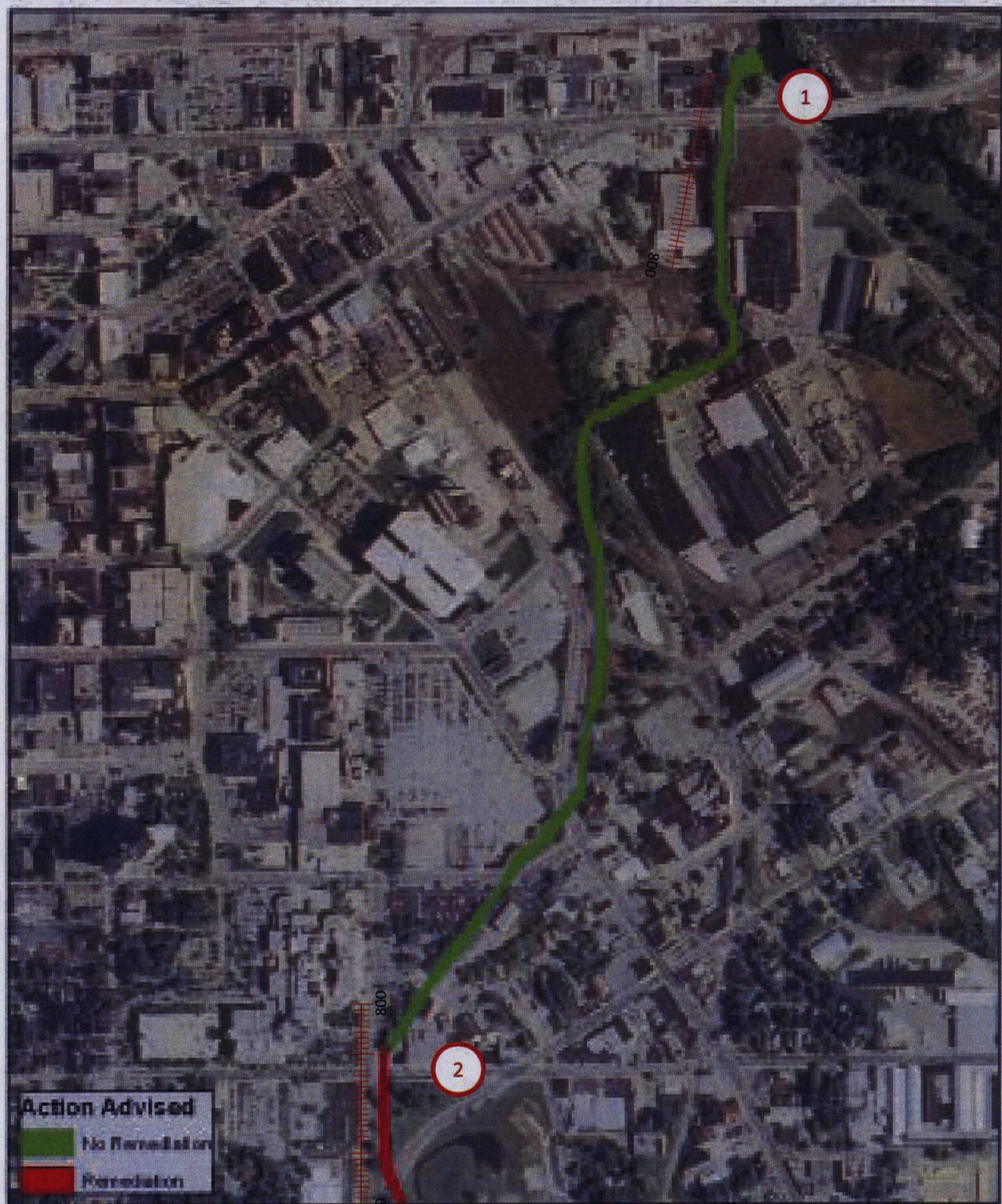


Figure 3a. Remediation areas for 40 ppm clean-up

Kalamazoo River: Portage Creek South
40 ppm Block Based Cleanup

Kalamazoo, MI
June 2010



© 2010 MRC, NAD 83
Data Source: USGS / USFWS / ARCADIS
RPM, James Galt
Map Author: Mike Meyer



Figure 3b. Remediation areas for 40 ppm clean-up

Kalamazoo River: Portage Creek North
20 ppm Block Based Cleanup

Kalamazoo, MI

June 2010



UTM Zone 18U, NAD 83
Data Source: USGS / USGS / ARCADIS
JPM / James Clark
Map Author: Billie Weyer



Figure 4a. Remediation areas for 20 ppm clean-up

Kalamazoo River: Portage Creek South
20 ppm Block Based Cleanup

Kalamazoo, MI

June 2010



USM Zone 18N, RAD 00
Data Source: USGS / USEPA / AECADIS
APM: Andrew Davis
Map Author: Mike Wojcik



Figure 4b. Remediation areas for 20 ppm clean-up

Kalamazoo River: Portage Creek North
10 ppm Block Based Cleanup

Kalamazoo, MI
June 2010



UTM Zone 18N, NAD 83
Data Source: USGS / USGS / ARCADIS
APR: James Stark
Map Author: Bill Hight



Figure 5a. Remediation areas for 10 ppm clean-up

Kalamazoo River: Portage Creek South
10 ppm Block Based Cleanup

Kalamazoo, MI

June 2010



UTM Zone 18N, NAD 83
Data Source: USDA / US EPA / ARCADIS
RPM: James Clark
Map Author: Mike Mejer



Figure 5b. Remediation areas for 10 ppm clean-up

Kalamazoo River: Portage Creek North
5 ppm Block Based Cleanup

Kalamazoo, MI

June 2010



UTM Zone 18N, EAD 60
Data Source: USGS / USFWS / ARCADIS
RPMT James Stark
Map Author: Mike Meyer



Figure 6a. Remediation areas for 5 ppm clean-up

Kalamazoo River: Portage Creek South 5 ppm Block Based Cleanup

Kalamazoo, MI
June 2010

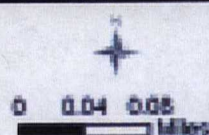


Figure 6b. Remediation areas for 5 ppm clean-up

Kalamazoo River: Portage Creek North
1 ppm Block Based Cleanup

Kalamazoo, MI

June 2010



DTM Zone 16N 6040 03
Data Source: USDA / OSERR / ARCADIS
RPM: James Galt
Map Author: Mike Majic



Figure 7a. Remediation areas for 1 ppm clean-up

Kalamazoo River: Portage Creek South
1 ppm Block Based Cleanup

Kalamazoo, MI

June 2010



UTM Zone 18N, NAD 83
Data Source: USGS / US EPA / ARCADIS
RPRI: James Galt
Map Author: Brian Wojcik



Figure 7b. Remediation areas for 1 ppm clean-up

Attachment B
Cost Estimate Summary

Cost	\$ 714,022	\$ 1,872,160	\$ 3,244,809	\$ 4,029,305	\$ 5,238,643
5%	\$ 35,701	\$ 93,608	\$ 162,240	\$ 201,465	\$ 261,932
15%	\$ 107,103	\$ 280,824	\$ 486,721	\$ 604,396	\$ 785,797
SUBCONTRACT VALUE	\$ 856,826	\$ 2,246,592	\$ 3,893,771	\$ 4,835,166	\$ 6,286,372
L SERVICES CAPITAL COSTS					
3%	\$ 25,705	\$ 67,398	\$ 116,813	\$ 145,055	\$ 188,591 CCI Historic
10%	\$ 85,683	\$ 224,659	\$ 389,377	\$ 483,517	\$ 628,637 CCI Historic
5%	\$ 42,841	\$ 112,330	\$ 194,689	\$ 241,758	\$ 314,319 CCI Historic
management	\$ 154,229	\$ 404,387	\$ 700,879	\$ 870,330	\$ 1,131,547
LUE	\$ 1,011,055	\$ 2,650,979	\$ 4,594,650	\$ 5,705,495	\$ 7,417,919
50%	\$ 1,516,582	\$ 3,976,468	\$ 6,891,975	\$ 8,559,243	\$ 11,126,879 ROM Level
10 -30%	\$ 707,738	\$ 1,855,685	\$ 3,216,255	\$ 3,993,847	\$ 5,192,543 ROM Level

Exclusions are provided for this estimate under a separate sheet and should be read in conjunction with this estimate

DATA and ASSUMPTIONS

Portage Creek Mechanical Dredging Class 4 ROM Price
Rough Order of Magnitude Estimate
Alamazoo, MI

Upper Lower

50% -30%

ROM ESTIMATE DISCLAIMER

This estimate has been developed and provided as an Order of Magnitude Estimate (ROM)/Budgetary Estimate and as such is suitable for the purpose of budget development and/or planning only. This estimate is offered as an opinion of cost to perform the work and is not an offer to contract for construction services; procure and/or provide such services.

OVERALL ASSUMPTIONS FOR THIS ROM

- 1 UNION LABOR
- 2 Mechanical Dredging
- 3 Provide estimate for removal of >80 ppm; >40 ppm; >20ppm; >10ppm; >5 ppm PCB

Data and Assumptions Summaries

GENERAL SCOPE OF WORK TO PERFORM

Mechanically dredge PCB contaminated sediments As Shown in tables below
ROM Assumes that all access agreements and permits to remove trees is obtainable
ROM assumes that all work is performed from the land except cleaning in culverts and under bridges
ROM assumes that dredged sediments will be mixed with pozzolagn before shipment to permitted landfill
ROM assumes production rates and equipment necessary to control turbidity in high flow rate situations
Work in any area may include the following tasks

MOBILIZE DREDGING SUB TO FIRST AREA
CLEARING CREW COST
MECHANICAL DREDGING CREW
SOLIDIFICATION COSTS
BRIDGE CLEARING RESOURCES
WATER HANDLING CREW
SURVEYING CREW
STREAM RESTORATION COST
HOT COST
MONITORING RESOURCES COST
T&D COST (TSCA)
T&D Cost (non-TSCA)
REMOB TO NEW AREA COST
ACCESS AGREEMENT NEGOTIATION
TADWATER TREATMENT OF FREE WATER

PROJECT DRAWINGS and SKETCHES Used in this ROM

Please refer to "Portage Creek Estimation of Volume of Contaminated Sediments and PCB Mass from 2009 Sampling", field Environmenta Decision Support, 2009
Dredging Area Lifts.pptx

GLOBAL MULTIPLIERS and RATES USED IN ROM CALCULATIONS

Wages in Estimate	Rate	Sub Labor Multiplier		Cost
		FR	1.15	
Operator (All)	\$ 30.12	\$ 17.80	\$	\$ 55.11
Operator OT (All)	\$ 45.18	\$ 8.78	\$	\$ 59.75
Operator (All)	\$ 20.57	\$ 9.88	\$	\$ 35.02
Operator OT (All)	\$ 30.88	\$ 4.83	\$	\$ 40.81
Electrician ST	\$ 30.00	\$ 15.02	\$	\$ 51.77
Electrician OT	\$ 45.00	\$ 15.47	\$	\$ 69.54
Turner ST	\$ 30.50	\$ 14.10	\$	\$ 51.28
Turner OT	\$ 45.75	\$ 21.15	\$	\$ 76.94
Carpenter ST	\$ 23.28	\$ 11.15	\$	\$ 39.57
Carpenter OT	\$ 34.88	\$ 18.73	\$	\$ 59.36

Subcontractor Markup Assumptions				
Code	Resource			Sub Contractor Markup
1	Labor 1	0.0%	0.0%	25.0%
2	Labor 2	0.0%	0.0%	25.0%
3	2nd Tier Sub	0.0%	0.0%	25.0%
4	ODC	0.0%	0.0%	25.0%
5	Disposal	0.0%	0.0%	25.0%

Markups Summary (USED ON PM Resources Cost Sheet)

MARKUPS (Multipliers)				
Code	Resource	Fringe	Fee	CCI G&A
1	CCI Labor	0.319	7%	11.7%
2	INC Labor	0.395	7%	11.7%
3	Subcontractor	-	7%	11.7%
4	ODC (CH2M HILL)	-	7%	11.7%
5	Disposal	-	7%	11.7%

Takeoff (ROM PURPOSES) Mass Balances of Dredge Material

GENERAL MASS BALANCE ASSUMPTIONS

assumed Bulk Density 1.5 ton/cy
 assumed Overdredge 0.5 ft
 assumed Solidification Ratio 3%
 assumed Free Water Generation 40 gal/cy

Based on high end estimate for similar sediment
 Typical specification for sediment dredging
 Estimate based on other projects
 Based on 10% of 2 cy bucket

Location	PRELIMINARY DISTANCES, WIDTHS, DEPTHS and VOLUMES						Est Mass (tons)
	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acres)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)		
Alcott St to Bryant St Bridge	503	20	0.23	0.5	186		279
Yant St Bridge	20	20	0.01	0.5	7		11
Yant St to Reed Ave	876	20	0.40	0.5	324		486
Reed Ave Bridge	58	20	0.03	0.5	21		32
Reed Ave Bridge to Reed Ct Bend	712	20	0.33	0.71	374		562
Reed Ct Bend to RR Bridge 1	276	20	0.13	0.71	145		218
RR Bridge 1	37	20	0.02	0.71	19		29
RR Bridge 1 to Stockbridge	248	20	0.11	0.71	130		188
Stockbridge Bridge	67	20	0.03	0			
Stockbridge to Lake St	931	20	0.43	2.25	1,552		2,328
Lake St Bridge	46	20	0.02	3	102		163
Lake St to E Crosstown Pkwy	990	30	0.67	4.25	4,628		6,942
Crosstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	4.25	472		708
Crosstown Pkwy to E Vine St	390	40	0.36	4.25	2,456		3,683
Vine St Bridge	67	40	0.08	2.1	208		313
Vine St to E Dutton St	361	28	0.23	3	1,123		1,685
Dutton St Bridge	58	33	0.04	2	142		213
Dutton St to Walnut St	484	37	0.41	4.5	2,985		4,477
Walnut St Bridge	72	42	0.07	6.25	700		1,050
Walnut St to Portage St	270	42	0.28	5.5	2,310		3,465
Portage St Bridge	80	34	0.06	5.5	554		831
Portage St to S Pitcher	723	25	0.41	5.5	3,682		5,523
Pitcher Bridge	66	25	0.04	4.5	271		408
Pitcher to RR Bridge 2	334	25	0.19	2.75	860		1,276
RR Bridge 2	65	25	0.04	2.5	150		228
RR Bridge 2 to RR Bridge 3	405	25	0.23	2.5	938		1,406
RR Bridge 3	30	25	0.02	2.5	69		104
RR Bridge 3 to RR Bridge 4	1577	25	0.91	2.5	3,650		5,476
RR Bridge 4	30	25	0.02	2.5	69		104
RR Bridge 4 to E Michigan	652	30	0.45	3.5	2,536		3,803
Michigan Bridge	87	30	0.06	3.5	338		508
Michigan St to Confluence	286	51	0.33	3.5	1,881		2,836
	10889		6.67		32,886		49,328

Values estimated from - Portage Creek Longitudinal Profile - Arcadis 8/21/2008

80 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)'	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (ft)	Site Restoration (ft)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge							-					
Bryant St Bridge							-					
Bryant St to Reed Ave							-					
Reed Ave Bridge							-					
Reed Ave Bridge to Reed Ct Bend							-					
Reed Ct Bend to RR Bridge 1							-					
RR Bridge 1							-					
RR Bridge 1 to Stockbridge							-					
Stockbridge Bridge							-					
Stockbridge to Lake St							-					
Lake St Bridge							-					
Lake St to E. Crossstown Pkwy	100	30	0.07	3.5	388	444	667	100	100	20	667	17,778
Crossstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	388	444	667	-	-	20	667	17,778
Crossstown Pkwy to E. Vine St	53	40	0.05	3.5	275	314	471	-	53	14	485	12,563
Vine St Bridge							-					
Vine St to E. Dutton St							-					
Dutton St Bridge							-					
Dutton St to Walnut St							-					
Walnut St Bridge							-					
Walnut St to Portage St							-					
Portage St Bridge							-					
Portage St to S. Pitcher							-					
S. Pitcher Bridge							-					
Pitcher to RR Bridge 2							-					
RR Bridge 2							-					
RR Bridge 2 to RR Bridge 3							-					
RR Bridge 3							-					
RR Bridge 3 to RR Bridge 4							-					
RR Bridge 4							-					
RR Bridge 4 to E. Michigan							-					
Michigan Bridge							-					
Michigan St to Confluence							-					
	253		0.19		1,053	1,203	1,904	100	153	54	1,859	48,119

Values estimated from - Portage Creek Estimation of Volumes - Arcadis 6/4/2010

40 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft) ¹	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (ft)	Site Restoration (ft)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge							-					
Yerant St Bridge							-					
Yerant St to Reed Ave							-					
Reed Ave Bridge							-					
Reed Ave Bridge to Reed Ct Bend							-					
Reed Ct Bend to RR Bridge 1							-					
RR Bridge 1							-					
RR Bridge 1 to Stockbridge							-					
Stockbridge Bridge							-					
Stockbridge to Lake St	100	20	0.05	0.5	37	74	56	100	100	1.67	57	2,983
Lake St Bridge	23	20	0.01	0.5	9	17	13		-	0.38	13	681
Lake St to E Crosstown Pkwy	200	30	0.14	3.5	778	889	1,167	200	200	35.00	1,202	35,556
Crosstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	389	444	583		-	17.50	601	17,778
Crosstown Pkwy to E Vine St	380	40	0.36	3.5	2,022	2,311	3,033		380	91.00	3,124	92,444
Vine St Bridge	67	40	0.06	0.5	50	99	74		-	2.23	77	3,970
Vine St to E Dutton St	75	28	0.05	0.5	39	78	58		75	1.75	60	3,111
Dutton St Bridge							-					
Dutton St to Walnut St							-					
Walnut St Bridge							-					
Walnut St to Portage St							-					
Portage St Bridge							-					
Portage St to S Pitcher							-					
Pitcher Bridge							-					
Pitcher to RR Bridge 2							-					
RR Bridge 2							-					
RR Bridge 2 to RR Bridge 3							-					
RR Bridge 3							-					
RR Bridge 3 to RR Bridge 4							-					
RR Bridge 4							-					
RR Bridge 4 to E Michigan							-					
Michigan Bridge							-					
Michigan St to Confluence	50	10	0.01	0.5	9	18	14	50	50	0.42	14	741
	1005		0.74		3,332	3,931	4,988	350	815	149.95	5,148	157,244

Values estimated from - Portage Creek Estimation of Volumes - Arcadis 6/4/2010

20 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (sf)	Site Restoration (ft)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge	125	20	0.06	0.5	46	93	69	125	125	2.08	72	3,704
Bryant St Bridge			-	-	-	-	-	-	-	-	-	-
Bryant St to Reed Ave			-	-	-	-	-	-	-	-	-	-
Reed Ave Bridge			-	-	-	-	-	-	-	-	-	-
Reed Ave Bridge to Reed Ct Bend	125	10	0.03	0.5	23	46	35	-	125	1.04	36	1,852
Reed Ct Bend to RR Bridge 1			-	-	-	-	-	-	-	-	-	-
RR Bridge 1			-	-	-	-	-	-	-	-	-	-
RR Bridge 1 to Stockbridge			-	-	-	-	-	-	-	-	-	-
Stockbridge Bridge			-	-	-	-	-	-	-	-	-	-
Stockbridge to Lake St	100	20	0.05	4	296	333	444	100	100	13.33	458	13,333
Lake St Bridge	23	20	0.01	4	68	77	102	-	-	3.07	105	3,067
Lake St to E Crosstown Pkwy	425	30	0.28	4	1,889	2,125	2,833	425	425	85.00	2,918	85,000
Crosstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	4	444	500	687	-	-	20.00	687	20,000
Crosstown Pkwy to E Vine St	390	40	0.36	4	2,311	2,600	3,487	-	390	104.00	3,571	104,000
Vine St Bridge	67	40	0.06	4	397	447	596	-	-	17.87	613	17,867
Vine St to E Dutton St	75	28	0.05	4	311	350	487	-	75	14.00	481	14,000
Dutton St Bridge		33	-	-	-	-	-	-	-	-	-	-
Dutton St to Walnut St		37	-	-	-	-	-	-	-	-	-	-
Walnut St Bridge		42	-	-	-	-	-	-	-	-	-	-
Walnut St to Portage St		42	-	-	-	-	-	-	-	-	-	-
Portage St Bridge		34	-	-	-	-	-	-	-	-	-	-
Portage St to S Pitcher		25	-	-	-	-	-	-	-	-	-	-
Pitcher Bridge		25	-	-	-	-	-	-	-	-	-	-
Pitcher to RR Bridge 2	200	25	0.11	3.5	648	741	972	200	200	28.17	1,001	29,630
RR Bridge 2		25	-	3.5	-	-	-	-	-	-	-	-
RR Bridge 2 to RR Bridge 3	405	25	0.23	3.5	1,313	1,500	1,989	405	405	59.06	2,028	60,000
RR Bridge 3	30	25	0.02	3.5	97	111	146	-	-	4.38	150	4,444
RR Bridge 3 to RR Bridge 4	125	25	0.07	3.5	405	463	608	125	125	18.23	628	18,519
RR Bridge 4		25	-	3.5	-	-	-	-	-	-	-	-
RR Bridge 4 to E Michigan	125	10	0.03	3.5	162	185	243	125	125	7.29	250	7,407
Michigan Bridge		30	-	3.5	-	-	-	-	-	-	-	-
Michigan St to Confluence	50	15	0.02	3.5	87	111	148	50	50	4.38	150	4,444
	2385		1.45		8,509	9,882	12,763	1,555	2,145	362.89	13,146	387,267

10 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft) ¹	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (sf)	Site Restoration (ft)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge	368	20	0.17	0.5	138	273	204	368	368	8.13	211	10,804
Yant St Bridge			-	-	-	-	-	-	-	-	-	-
Yant St to Reed Ave			-	-	-	-	-	-	-	-	-	-
Reed Ave Bridge			-	-	-	-	-	-	-	-	-	-
Reed Ave Bridge to Reed Ct Bend	175	10	0.04	0.71	46	76	69			2.07	71	3,137
Reed Ct Bend to RR Bridge 1			-	-	-	-	-	-	-	-	-	-
RR Bridge 1			-	-	-	-	-	-	-	-	-	-
RR Bridge 1 to Stockbridge			-	-	-	-	-	-	-	-	-	-
Stockbridge Bridge			-	-	-	-	-	-	-	-	-	-
Stockbridge to Lake St	200	16	0.07	3	333	389	500			15.00	515	15,556
Lake St Bridge	46	20	0.02	3	102	119	163			4.60	158	4,770
Lake St to E Crossdown Pkwy	454	25	0.28	3	1,261	1,471	1,882	454	454	56.75	1,948	58,852
Crossdown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	389	444	583	100	100	17.50	601	17,778
Crossdown Pkwy to E Vine St	390	40	0.36	3.5	2,022	2,311	3,033	390	390	81.00	3,124	92,444
Vine St Bridge	67	40	0.08	3.5	347	397	521			16.63	537	15,881
Vine St to E Dutton St	400	28	0.26	3	1,244	1,452	1,887			58.00	1,923	58,074
Dutton St Bridge		33	-	-	-	-	-	-	-	-	-	-
Dutton St to Walnut St	50	37	0.04	3	206	240	308	50	50			
Walnut St Bridge		42	-	-	-	-	-	-	-	-	-	-
Walnut St to Portage St		42	-	-	-	-	-	-	-	-	-	-
Portage St Bridge		34	-	-	-	-	-	-	-	-	-	-
Portage St to S Pitcher		25	-	-	-	-	-	-	-	-	-	-
Pitcher Bridge		25	-	-	-	-	-	-	-	-	-	-
Pitcher to RR Bridge 2		25	-	-	-	-	-	-	-	-	-	-
RR Bridge 2	220	25	0.13	4	815	917	1,222	220	220	36.67	1,259	38,667
RR Bridge 2 to RR Bridge 3	30	25	0.02	4	111	125	167	30	30			
RR Bridge 3	675	25	0.39	3	1,875	2,188	2,813	675	675	84.38	2,897	87,500
RR Bridge 3 to RR Bridge 4	30	25	0.02	3	83	97	125	30	30	3.75	129	3,889
RR Bridge 4	150	25	0.09	3	417	486	625	150	150	18.75	644	19,444
RR Bridge 4 to E Michigan	30	25	0.02	3	83	97	125	30	30			
Michigan Bridge	300	30	0.21	3	1,000	1,167	1,500	300	300	45.00	1,545	46,667
Michigan St to Confluence	150	51	0.18	3	850	992	1,275	150	150	38.25	1,313	38,667
	3835		2.38		11,322	13,146	18,963	2,947	2,757	491.48	18,874	511,230

Go to bridge 2210 11 PM

5 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft) ¹	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (sf)	Site Restoration (sf)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
E Alcott St to Bryant St Bridge	368	20	0.17	0.5	138	273	204	368	368	6.13	211	10,904
Bryant St Bridge			-	-	-	-	-					
Bryant St to Reed Ave	300	10	0.07	0.5	58	111	83	300	300	2.50	86	4,444
Reed Ave Bridge			-	-	-	-	-					
Reed Ave Bridge to Reed Ct Bend	300	10	0.07	0.71	79	134	118			3.55	122	5,378
Reed Ct Bend to RR Bridge 1			-	-	-	-	-					
RR Bridge 1			-	-	-	-	-					
RR Bridge 1 to Stockbridge			-	-	-	-	-					
Stockbridge Bridge			-	-	-	-	-					
Stockbridge to Lake St	931	15	0.32	3	1,552	1,810	2,328			69.83	2,397	72,411
Lake St Bridge	46	20	0.02	3	102	119	163			4.60	158	4,770
Lake St to E Crosstown Pkwy	980	20	0.45	3.5	2,541	2,804	3,811	980	980	114.33	3,925	116,148
E Crosstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	389	444	583	100		17.50	601	17,778
E Crosstown Pkwy to E Vine St	390	40	0.36	3.5	2,022	2,311	3,033	390	390	91.00	3,124	92,444
E Vine St Bridge	67	40	0.06	4	397	447	586			17.87	613	17,867
E Vine St to E Dutton St	400	28	0.26	4	1,659	1,867	2,489			74.67	2,584	74,667
E Dutton St Bridge		33	-	-	-	-	-					
E Dutton St to Walnut St	50	37	0.04	4.5	308	343	463		50			
Walnut St Bridge		42	-	-	-	-	-					
Walnut St to Portage St		42	-	-	-	-	-					
Portage St Bridge		34	-	-	-	-	-					
Portage St to S Pitcher		25	-	-	-	-	-					
S Pitcher Bridge		25	-	-	-	-	-					
S Pitcher to RR Bridge 2	220	25	0.13	4	815	817	1,222	220	220	36.67	1,259	36,667
RR Bridge 2	30	25	0.02	4	111	125	167	30				
RR Bridge 2 to RR Bridge 3	675	25	0.39	3.5	2,188	2,500	3,281	675	675	98.44	3,380	100,000
RR Bridge 3	30	25	0.02	3.5	97	111	148	30		4.38	150	4,444
RR Bridge 3 to RR Bridge 4	150	25	0.08	3.5	486	556	729	150	150	21.88	751	22,222
RR Bridge 4	30	25	0.02	3.5	97	111	148	30				
RR Bridge 4 to E Michigan	400	30	0.28	3.5	1,556	1,778	2,333	400	400	70.00	2,403	71,111
E Michigan Bridge	87	15	0.03	3.5	169	183	254					
E Michigan St to Confluence	250	51	0.29	3.5	1,653	1,869	2,479	250	250	74.38	2,554	75,556
	5804		3.14		16,413	18,942	24,619	3,923	3,783	707.70	24,288	726,811

Capital Purchasing, :Fabrication and Delivery of Equipment

DATA-ASSUMPTIONS (PORTAGE)
Portage Creek Dredge Class 4 ROM (7-07-10) v2 (ter djc) (version 1).xlsb

ROM ESTIMATE GENERAL SUBCONTRACTOR TASKS

Description	Task No	No of Units	Unit	Detail Tab Location	Notes
MOBILIZE DREDGING SUB TO FIRST AREA	G01	1	LS	GENTASK DETAIL (PORTAGE)	Cost to Mobilize Initially to the Project. Cost used to estimate mobilization expenses for subcontractor for each option
LEAVING CREW COST	G02	1	DAY	GENTASK DETAIL (PORTAGE)	Daily cost for removal of trees and other vegetation from areas to be Mechanically Dredged.
MECHANICAL DREDGING CREW	G03	1	DAY	GENTASK DETAIL (PORTAGE)	Daily cost for 1 day production from a Mechanical Dredging Crew.
SOLIDIFICATION COSTS	G04	1	TON	GENTASK DETAIL (PORTAGE)	Cost assumes perpendicular excavation from banks Cost for solidification of 1 ton of dredged sediment for transfer to dumptruck for T&D
BRIDGE CLEARING RESOURCES	G05	1	DAY	GENTASK DETAIL (PORTAGE)	Daily cost for Horizontal Drill Crew to scrape material from beneath bridges so they can be excavated
WATER HANDLING CREW	G06	1	DAY	GENTASK DETAIL (PORTAGE)	Daily cost for personnel and equipment to collect and treat free water and turbid water generated during dredging
SURVEYING CREW	G07	1	DAY	GENTASK DETAIL (PORTAGE)	Daily cost for confirmation that sediment has been removed and to layout new dredging areas
STREAM RESTORATION COST	G08	100	LF	GENTASK DETAIL (PORTAGE)	Cost to replant areas after dredging is complete. Includes area adjacent to stream only x 30 ft layback
T&D COST	G09	1	LS	GENTASK DETAIL (PORTAGE)	Cost to generate and negotiate one Maintenance of Traffic permit for performance of workwork
MONITORING RESOURCES COST	G10	1	DAY	GENTASK DETAIL (PORTAGE)	Air monitoring, water quality monitoring, sampling and analysis per day in field. Monitoring labor included on PM Resources costs
T&D COST (TSCA)	G11	20	TON	GENTASK DETAIL (PORTAGE)	Cost to ship 1 ton to TSCA Disposal
T&D Cost (non-TSCA)	G12	20	TON	GENTASK DETAIL (PORTAGE)	Cost to ship 1 ton to Subtitle D Disposal
REMOB TO NEW AREA COST	G13	1	LS	GENTASK DETAIL (PORTAGE)	Local repositioning of equipment to new work area
ACCESS AGREEMENT NEGOTIATION	G14	1	LS	GENTASK DETAIL (PORTAGE)	Cost to generate and negotiate one Access Agreement for performance of workwork
T&D WATER TREATMENT OF FREE WATER	G15	4,000	GAL	GENTASK DETAIL 2 (PORTAGE)	Cost to collect and transport free water collected in watertight boxes to disposal
SHIFT DREDGING EQUIPMENT	G16	1	LS	GENTASK DETAIL 2 (PORTAGE)	Cost to shift Dredging Equipment to new area
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
Not Used	N/A	0	N/A		
DESIGN and PROJECT MANAGEMENT RESOURCES	PM			PM RESOURCES (FAWN DREDGE)	Estimated Design and Oversight Resources

PROJECT ROM TASK UNIT RATE ESTIMATE SUMMARY
Portage Creek Mechanical Dredging Class 4 Rough Order of Magnitude Estimate
Kalamazoo, MI

ROM ESTIMATE DISCLAIMER

This estimate has been developed and provided as an Order of Magnitude Estimate (ROM)/Budgetary Estimate and as such is suitable for the purpose of budget development and/or planning only. This estimate is offered as an estimate of cost to perform the work and is not an offer to contract for construction services, procure and/or provide such services.

Item No.	Task Description	UOM	Quantity	Estimated Cost (USD)	Est Production Rate	Production Rate Unit	Unit Rate for Cost Calc	Unit
G01	MOBILIZE DREDGING SUB TO FRST AREA	LS	1	\$ 38,728	\$ 1	LS	\$ 38,728	LS
G02	CLEARING CREW COST	DAY	1	\$ 7,188	\$ 100	LF/day	\$ 71.88	\$/LF
G03	MECHANICAL DREDGING CREW	DAY	1	\$ 3,542	\$ 100	cy/day	\$ 35.42	\$/CY
G04	SOLIDIFICATION COSTS	TON	1	\$ 3,029	\$ 180.00	ton/day	\$ 20.19	\$/ton agent
G05	BRIDGE CLEARING RESOURCES	DAY	1	\$ 8,011	\$ 60	cy/day	\$ 180.23	\$/CY
G06	WATER HANDLING CREW	DAY	1	\$ 2,412	\$ 1	day	\$ 2,411.85	\$/Day
G07	SURVEYING CREW	DAY	1	\$ 2,888	\$ 1	day	\$ 2,888	\$/Day
G08	STREAM RESTORATION COST	LF	100	\$ 10,083	\$ 100	ft/day	\$ 100.83	\$/LF
G09	MOT COST	LS	1	\$ 9,441	\$ 1	LS	\$ 9,441	LS
G10	MONITORING RESOURCES COST	DAY	1	\$ 4,575	\$ 7	Day	\$ 696	\$/Day
G11	T&D COST (TSCA)	TON	20	\$ 3,891	\$ 20	ton	\$ 179.55	\$/Ton
G12	T&D Cost (non-TSCA)	TON	20	\$ 638	\$ 20	ton	\$ 28.25	\$/Ton
G13	REMOB TO NEW AREA COST	LS	1	\$ 5,630	\$ 1	LS	\$ 5,630	LS
G14	ACCESS AGREEMENT NEGOTIATION	LS	1	\$ 14,375	\$ 1.00	LS	\$ 14,375	LS
G15	T&DWATER TREATMENT OF FREE WATER	GAL	4,000	\$ 1,800.00	\$ 4,000.00	gal	\$ 0.45	\$/Gnl
G16	SHIFT DREDGING EQUIPMENT	LS	1	\$ 6,200.00	\$ 1.00	LS	\$ 6,200	LS

EST BUILDUP DETAILS

anical Dredging Class 4 Rough Order of Magnitude Estimate

7/12/2010 16:11

ROM ESTIMATE DISCLAIMER

This estimate has been developed and provided as an Order of Magnitude Estimate (ROM) for preliminary planning and as such is suitable for the purpose of budget development and/or preliminary design. This estimate is offered as an opinion of cost to perform the work and is not an offer to contract for construction services, precise unit price or any other services.

of include CH2M HILL effort estimates or Means data as indicated on Davis-Bacon rates for Kalamazoo, MI. Plions Tab for Scope Details

DAVIS BACON WAGES			
	Rate	FR	
Operator (All)	\$ 30.12	\$ 17.80	\$ 55.11
Operator OT (All)	\$ 45.18	\$ 6.78	\$ 59.75
Labor (All)	\$ 20.57	\$ 9.88	\$ 35.02
Labor OT (All)	\$ 30.86	\$ 4.83	\$ 40.81
Electrician ST	\$ 30.00	\$ 15.02	\$ 51.77
Electrician OT	\$ 45.00	\$ 15.47	\$ 69.54
Plumber ST	\$ 30.50	\$ 14.10	\$ 51.29
Plumber OT	\$ 45.75	\$ 21.15	\$ 78.94
Carpenter ST	\$ 23.28	\$ 11.15	\$ 39.57
Carpenter OT	\$ 34.89	\$ 16.73	\$ 59.36

DESCRIPTION	No of Units	Unit	Cost	Production Rate	Unit	Unit Rate for Cost Calc
DREDGING SUB TO FIRST AREA	1	LS	\$ 38,728	1	LS	\$ 38,728
Initialize Initially to the Project. Cost used to estimate expenses for subcontractor for each option						
EW COST	1	DAY	\$ 7,188	100	LF/day	\$ 71.88
removal of trees and other vegetation from areas nearby Dredged.						
DREDGING CREW	1	DAY	\$ 3,642	100	cy/day	\$ 36.42
for 1 day production from a Mechanical Dredging assumes perpendicular excavation from banks						
IN COSTS	1	TON	\$ 3,029	180.00	ton/day	\$ 20.19
ification of 1 ton of dredged sediment for transfer (for T&D)						
RING RESOURCES	1	DAY	\$ 8,011	60	cy/day	\$ 160
Horizontal Drill Crew to scrape material from gas so they can be excavated						
LING CREW	1	DAY	\$ 2,412	1	day	\$ 2,412
personnel and equipment to collect and treat free rid water generated during dredging						
REW	1	DAY	\$ 2,885	1	day	\$ 2,885
confirmation that sediment has been removed from new dredging areas						
ORATION COST	100	LF	\$ 10,083	100	lf/day	\$ 100.83
unit areas after dredging is complete. Includes area stream only x 30 ft layback						
rate and negotiate one Maintenance of Traffic performance of workwork	1	LS	\$ 9,441	1	LS	\$ 9,441

ESOURCES COST		1	DAY	\$	4,875	7	Day	\$	896
i. Water quality monitoring, sampling and analysis									
d. Monitoring labor included on PM Resources									
(A)	ton to TSCA Disposal	20	TON	\$	3,661	20	ton	\$	179
(B)	ton to Subtitle D Disposal	20	TON	\$	625	20	ton	\$	28
V AREA COST	oning of equipment to new work area	1	LS	\$	6,630	1	LS	\$	6,630

AL TASK DETAILS

SING SUB TO FIRST AREA		Description	Resource Description	No of Units	Unit Rate	Units	Add Units	Unit Description	Raw Cost	Contractor Markup	Contractor W Amt.
Contractor	Mob Dozer/IT/28		D-5 Dozer	1	\$ 500.00	\$/trip	1	Day	\$ 500.00	25.0%	\$
Contractor	Est. Clear and Grade Access Road		D-5 Dozer	1	\$ 350.00	\$/day	1	Day	\$ 350.00	25.0%	\$
Contractor	Est.		Purchase and install geotextile wide - 6 in #3 stone	6000	\$ 0.05	\$/sf	1	na	\$ 300.00	25.0%	\$
Contractor	Est. Access Road Stone Purchase		Purchase Stone - 500 ft x 12 ft	165	\$ 15.00	tons	1	na	\$ 2,475.00	25.0%	\$
Contractor	Est. Place Stone		Stone Placement Equipment	1	\$ 350.00	\$/day	1	Day	\$ 350.00	25.0%	\$
Contractor	Est. Labor Expense		Operator ST	8	\$ 55.11	\$/hr	3	Day	\$ 1,322.56	25.0%	\$
Contractor	Est. Labor Expense		Operator OT	4	\$ 59.75	\$/hr	3	Day	\$ 717.01	25.0%	\$
Contractor	Est. Labor Expense		Labor ST	32	\$ 35.02	\$/hr	3	Day	\$ 3,381.88	25.0%	\$
Contractor	Est. Labor Expense		Labor OT	16	\$ 40.81	\$/hr	3	na	\$ 1,956.68	25.0%	\$
Contractor	Est. Labor Expense		Perdiem	4	\$ 150.00	\$/day	3	na	\$ 1,800.00	25.0%	\$
Contractor	Est. Labor Expense		Truck	2	\$ 75.00	\$/day	3	na	\$ 450.00	25.0%	\$
Contractor	Est. Construct Load relay area		2 x 6, 60 mil liner, pumps, etc	1	\$ 1,500.00	LS	1	na	\$ 1,500.00	25.0%	\$
storage tank	Est.		1,000 gal mobile tank and pump, Rain for Rent	1	\$ 500.00	\$/trip	1	na	\$ 500.00	25.0%	\$
Contractor	Est. Purchase Sediment Curtain		50 ft x 5 ft, 2 ea downstream	4	\$ 1,000.00	\$/event	1	EA	\$ 4,000.00	25.0%	\$ 1
Contractor	Est.		Board Mats	10	\$ 550.00	Allowance	1	na	\$ 5,500.00	25.0%	\$ 1
Contractor	Est.		Misc	1	\$ 200.00	\$/day	3	na	\$ 600.00	25.0%	\$
Contractor	Est.		Fuel	50	\$ 3.25	\$/gal	3	Day	\$ 487.50	25.0%	\$
Contractor	Mob Long Stick Excavator		Cat 320	1	\$ 1,000.00	\$/trip	1	Day	\$ 1,000.00	25.0%	\$
Contractor	Mob Environmental Bucket		2 cy	1	\$ 1,000.00	\$/trip	1	Day	\$ 1,000.00	25.0%	\$
Boxes	Sub to fabricate boxes		25 cy, no rear door	3	\$ 500.00	\$/trip	1	na	\$ 1,500.00	25.0%	\$
print	CAT 302			2	\$ 500.00	\$/trip	1	na	\$ 1,000.00	25.0%	\$
print	Mixing Attachment			1	\$ 500.00	\$/trip	1	na	\$ 500.00	25.0%	\$
print	Crane			6	\$ 120.00	\$/trip	1	na	\$ 860.00	25.0%	\$
									\$ 30,892.48		\$ 7

2. Pumps, Tools

ING RESOURCES

Resource	Resource Description	Quantity	Unit Rate	Units	Add Units	Unit Description	Cost	Contractor G&A	Contractor GI
Est. Labor	Operator ST	8	\$ 55.11	\$/hr	1	Day	\$ 440.88	25.0%	\$
Est. Labor	Operator OT	4	\$ 59.75	\$/hr	1	Day	\$ 239.00	25.0%	\$
Est. Labor	Labor ST	16	\$ 35.02	\$/hr	1	Day	\$ 560.28	25.0%	\$
Est. Labor	Labor OT	8	\$ 40.81	\$/hr	1	Day	\$ 328.45	25.0%	\$
Est. Labor	Perdiem	3	\$ 150.00	\$/day	1	Day	\$ 450.00	25.0%	\$
Est. Labor	Truck	2	\$ 75.00	\$/day	1	Day	\$ 150.00	25.0%	\$
Est. Labor	Misc	1	\$ 200.00	\$/day	1	Day	\$ 200.00	25.0%	\$
Est. Labor	Fuel	50	\$ 3.25	\$/gal	1	Day	\$ 162.50	25.0%	\$
Horizontal Drill		1	\$ 2,500.00	\$/day	1	na	\$ 2,500.00	25.0%	\$
Drill Buckets		1	\$ 800.00	\$/day	1	day	\$ 800.00	25.0%	\$
Drill Bucket Rental		1	\$ 100.00	\$/day	1	day	\$ 100.00	25.0%	\$
Crane	Operated On call, ave 4 hours/day	4	\$ 120.00	\$/hr	1	day	\$ 480.00	25.0%	\$
							\$ 5,489.99		\$

zontal Drill Crew to scrape material from beneath bridges so they can be excavated of 50 cy/day

ING CREW

Resource	Resource Description	Quantity	Unit Rate	Units	Add Units	Unit Description	Cost	Contractor G&A	Contractor GI
Est. Collect Free Water From	Operator ST	8	\$ 55.11	\$/hr	1	day	\$ 440.88	25.0%	\$
Est. Collect Free Water From	Operator OT	4	\$ 59.75	\$/hr	1	day	\$ 239.00	25.0%	\$
Est. Collect Free Water From	Labor ST	8	\$ 35.02	\$/hr	1	day	\$ 280.14	25.0%	\$
Est. Collect Free Water From	Labor OT	4	\$ 40.81	\$/hr	1	day	\$ 163.22	25.0%	\$
Est. Labor	Perdiem	2	\$ 150.00	\$/day	1	Day	\$ 300.00	25.0%	\$
Est. Labor	Truck	1	\$ 75.00	\$/day	1	Day	\$ 75.00	25.0%	\$
Est. Collect Free Water From	Water Tank Rental, 10,000 gal	1	\$ 175.00	\$/day	1	day	\$ 175.00	25.0%	\$
Est. Collect Free Water From	Vacuum Pump	1	\$ 75.00	\$/day	1	day	\$ 75.00	25.0%	\$
Est. Collect Free Water From	Misc Supply	1	\$ 100.00	\$/gal	1	day	\$ 100.00	25.0%	\$
Est. Collect Free Water From	Fuel	25	\$ 3.25	\$/gal	1	day	\$ 81.25	25.0%	\$
							\$ 1,929.48		\$

onal and equipment to collect and treat free water and turbid water generated during dredging

IEW

Resource	Resource Description	Quantity	Unit Rate	Units	Add Units	Unit Description	Cost	Contractor G&A	Contractor GI
Two-man Survey Crew	Standard Time	8	\$ 150.00	hr	1	day	\$ 1,200.00	25.0%	\$
Two-man Survey Crew	Overtime	4	\$ 225.00	hr	1	day	\$ 900.00	25.0%	\$
Data Processing		1	\$ 75.00	hr	1	day	\$ 75.00	25.0%	\$
Project Management		1	\$ 108.00	hr	1	day	\$ 108.00	25.0%	\$
Per Diem		0	\$ 150.00	Day	1	day	\$ 25.00	25.0%	\$
Supplies/stakes, etc.		1	\$ 25.00	Day	1	day	\$ 25.00	25.0%	\$
Surveyor Mob/Demob Cost	2 days/week	0	\$ 500.00	trip	1	day	\$ 25.00	25.0%	\$
							\$ 2,304.00		\$

Information that sediment has been removed and to layout new dredging areas

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AGE) 4 ROM (7-07-10) v2 (ler djc) (version 1).xlsx

COST BUILDUP DETAILS

Channel Dredging Class 4 Rough Order of Magnitude Estimate

7/12/2010 16:11

ROOM ESTIMATE DISCLAIMER

This estimate has been developed and provided as an Order of Magnitude Estimate (OOM) for the purpose of budget development and planning only. This estimate is offered as an opinion of cost to perform the work and is not an offer to contract for construction services, precise number provide such services.

not include CH2M-HILL effort on estimates or Means data as indicated used on Davis-Bacon rates for Maricopa County, Arizona imptions Tab for Scope Details

DAVIS BACON WAGES			
	Rate	FR	Total
Operator (AU)	\$ 30.12	\$ 17.80	\$ 55.11
Operator OT (AU)	\$ 45.18	\$ 6.78	\$ 59.75
Labor (AU)	\$ 20.57	\$ 9.88	\$ 35.02
Labor OT (AU)	\$ 30.88	\$ 4.83	\$ 40.81
Electrician ST	\$ 30.00	\$ 15.02	\$ 51.77
Electrician OT	\$ 45.00	\$ 15.47	\$ 68.54
Plumber ST	\$ 30.50	\$ 14.10	\$ 51.29
Plumber OT	\$ 45.75	\$ 21.15	\$ 76.94
Carpenter ST	\$ 23.26	\$ 11.15	\$ 39.57
Carpenter OT	\$ 34.89	\$ 18.73	\$ 59.36

DESCRIPTION	No of Units	Unit	Cost	Production Rate	Unit	Unit Rate for Cost Calc
REEMENT NEGOTIATION nerate and negotiate one Access Agreement for ce of workwork	1	LS	\$ 14,375	1	LS	\$ 14,375
TREATMENT OF FREE WATER illect and transport free water collected in watertight disposal	4,000	GAL	\$ 1,800	4,000	gal	\$ 0.45
GING EQUIPMENT ift Dredging Equipment to new area	1	LS	\$ 6,200	1	LS	\$ 6,200

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ORTAGE)
ROM:(7-07-10).v2 (ler djc) (version.1).xdsb

Attachment C
Takeoff Information

'ORTAGE CREEK TAKEOFF INFORMATION

PROJECT DRAWINGS and SKETCHES Used in this ROM

Please refer to "Portage Creek Estimation of Volume of Contaminated Sediments and PCB Mass from 2009 Sampling", Field Environmental Decision Support, 2010 Dredging Area Lifts.pptx

ROM ESTIMATE DISCLAIMER

This estimate has been developed and provided as an Order of Magnitude Estimate (ROM) for the purpose of budgetary estimates and as such is suitable for the purpose of budget development only. This estimate is offered as an opinion of cost to perform the work and is not an offer to construct for construction services, procure and/or provide such services.

Mass Balances of Dredge Material

GENERAL MASS BALANCE ASSUMPTIONS

assumed Bulk Density 1.5 ton/cy
 assumed Overdredge 0.5 ft
 assumed Solidification Ratio 3%
 assumed Free Water Generation 40 gal/cy

Based on high end estimate for similar sediment
 Typical specification for sediment dredging
 Estimate based on other projects
 Based on 10% of 2 cy bucket

Location	PRELIMINARY DISTANCES, WIDTHS, DEPTHS and VOLUMES					Est Mass (tons)
	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)	
Alcott St to Bryant St Bridge	503	20	0.23	0.5	186	278
Yant St Bridge	20	20	0.01	0.5	7	11
Yant St to Reed Ave	875	20	0.40	0.5	324	486
Reed Ave Bridge	58	20	0.03	0.5	21	32
Reed Ave Bridge to Reed Ct Bend	712	20	0.33	0.71	374	562
Reed Ct Bend to RR Bridge 1	276	20	0.13	0.71	145	218
RR Bridge 1	37	20	0.02	0.71	19	28
RR Bridge 1 to Stockbridge	248	20	0.11	0.71	130	186
Stockbridge Bridge	67	20	0.03	0	-	-
Stockbridge to Lake St	931	20	0.43	2.25	1,552	2,328
Lake St Bridge	46	20	0.02	0.2	102	153
Lake St to E Crossstown Pkwy	980	30	0.67	4.25	4,828	6,942
Crossstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	4.25	472	708
Crossstown Pkwy to E Vine St	390	40	0.36	4.25	2,458	3,683
Vine St Bridge	67	40	0.08	2.1	208	313
Vine St to E Dutton St	361	28	0.23	3	1,123	1,685
Dutton St Bridge	58	33	0.04	2	142	213
Dutton St to Walnut St	484	37	0.41	4.5	2,885	4,477
Walnut St Bridge	72	42	0.07	6.28	700	1,050
Walnut St to Portage St	270	42	0.26	5.5	2,310	3,465
Portage St Bridge	80	34	0.06	5.5	554	831
Portage St to S Pitcher	723	25	0.41	5.5	3,582	5,523
Pitcher Bridge	65	25	0.04	4.5	271	406
Pitcher to RR Bridge 2	334	25	0.19	2.76	850	1,276
RR Bridge 2	65	25	0.04	2.5	150	226
RR Bridge 2 to RR Bridge 3	405	25	0.23	2.5	938	1,406
RR Bridge 3	30	25	0.02	2.5	69	104
RR Bridge 3 to RR Bridge 4	1577	25	0.91	2.5	3,650	5,476
RR Bridge 4	30	25	0.02	2.5	69	104
RR Bridge 4 to E Michigan	652	30	0.45	3.5	2,536	3,803
Michigan Bridge	67	30	0.08	3.5	338	508
Michigan St to Confluence	288	51	0.33	3.5	1,881	2,838
	10889		6.67		32,886	49,328

80 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (ft)	Site Restoration (ft)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge							-					
Bryant St Bridge							-					
Bryant St to Reed Ave							-					
Reed Ave Bridge							-					
Reed Ave Bridge to Reed Ct Bend							-					
Reed Ct Bend to RR Bridge 1							-					
RR Bridge 1							-					
RR Bridge 1 to Stockbridge							-					
Stockbridge Bridge							-					
Stockbridge to Lake St							-					
Lake St Bridge							-					
Lake St to E Crosstown Pkwy	100	30	0.07	3.5	389	444	667	100	100	20	667	17,778
Crosstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	389	444	667	-	-	20	667	17,778
Crosstown Pkwy to E Vine St	53	40	0.05	3.5	275	314	471	-	53	14	485	12,563
Vine St Bridge							-					
Vine St to E Dutton St							-					
Dutton St Bridge							-					
Dutton St to Walnut St							-					
Walnut St Bridge							-					
Walnut St to Portage St							-					
Portage St Bridge							-					
Portage St to S Pitcher							-					
Pitcher Bridge							-					
Pitcher to RR Bridge 2							-					
RR Bridge 2							-					
RR Bridge 2 to RR Bridge 3							-					
RR Bridge 3							-					
RR Bridge 3 to RR Bridge 4							-					
RR Bridge 4							-					
RR Bridge 4 to E Michigan							-					
Michigan Bridge							-					
Michigan St to Confluence							-					
	253		0.19		1,053	1,203	1,804	100	153	54	1,859	48,119

Values estimated from - Portage Creek Estimation of Volumes - Arcadis 6/4/2010

40 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (ft)	Site Restoration (ft)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge												
Yant St Bridge							-					
Yant St to Reed Ave							-					
Reed Ave Bridge							-					
Reed Ave Bridge to Reed Ct Bend							-					
Reed Ct Bend to RR Bridge 1							-					
RR Bridge 1							-					
RR Bridge 1 to Stockbridge							-					
Stockbridge Bridge							-					
Stockbridge to Lake St	100	20	0.05	0.5	37	74	56	100	100	1.67	57	2,983
Lake St Bridge	23	20	0.01	0.5	9	17	13			0.38	13	681
Lake St to E Crossstown Pkwy	200	30	0.14	3.5	778	889	1,167	200	200	35.00	1,202	35,558
Crossstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	389	444	583			17.50	601	17,778
Crossstown Pkwy to E Vine St	390	40	0.36	3.5	2,022	2,311	3,033		390	91.00	3,124	92,444
Vine St Bridge	67	40	0.08	0.5	50	99	74			2.23	77	3,970
Vine St to E Dutton St	75	28	0.05	0.5	39	78	58			1.75	60	3,111
Dutton St Bridge							-					
Dutton St to Walnut St							-					
Walnut St Bridge							-					
Walnut St to Portage St							-					
Portage St Bridge							-					
Portage St to S Pitcher							-					
Pitcher Bridge							-					
Pitcher to RR Bridge 2							-					
RR Bridge 2							-					
RR Bridge 2 to RR Bridge 3							-					
RR Bridge 3							-					
RR Bridge 3 to RR Bridge 4							-					
RR Bridge 4							-					
RR Bridge 4 to E Michigan							-					
Michigan Bridge							-					
Michigan St to Confluence	50	10	0.01	0.5	9	19	14	50	50	0.42	14	741
	1005		0.74		3,332	3,831	4,988	350	815	149.96	5,148	157,244

Values estimated from - Portage Creek Estimation of Volumes - Arcadis 6/4/2010

Location	20 PPM PCB REMOVAL CHECK											
	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (sf)	Site Restoration (ft)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge	125	20	0.08	0.5	46	93	69	125	125	2.08	72	3,704
Bryant St Bridge			-	-	-	-	-	-	-	-	-	-
Bryant St to Reed Ave			-	-	-	-	-	-	-	-	-	-
Reed Ave Bridge			-	-	-	-	-	-	-	-	-	-
Reed Ave Bridge to Reed Ct Bend	125	10	0.03	0.5	23	48	35		125	1.04	38	1,852
Reed Ct Bend to RR Bridge 1			-	-	-	-	-	-	-	-	-	-
RR Bridge 1			-	-	-	-	-	-	-	-	-	-
RR Bridge 1 to Stockbridge			-	-	-	-	-	-	-	-	-	-
Stockbridge Bridge			-	-	-	-	-	-	-	-	-	-
Stockbridge to Lake St	100	20	0.05	4	286	333	444	100	100	13.33	458	13,333
Lake St Bridge	23	20	0.01	4	68	77	102		-	3.07	105	3,067
Lake St to E Crosstown Pkwy	425	30	0.28	4	1,889	2,125	2,833	425	425	85.00	2,918	85,000
Crosstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	4	444	500	667		-	20.00	687	20,000
Crosstown Pkwy to E Vine St	390	40	0.36	4	2,311	2,600	3,467		380	104.00	3,571	104,000
Vine St Bridge	67	40	0.08	4	387	447	596	*	-	17.87	613	17,867
Vine St to E Dutton St	75	28	0.05	4	311	350	487		75	14.00	481	14,000
Dutton St Bridge		33	-	-	-	-	-		-	-	-	-
Dutton St to Walnut St		37	-	-	-	-	-		-	-	-	-
Walnut St Bridge		42	-	-	-	-	-		-	-	-	-
Walnut St to Portage St		42	-	-	-	-	-		-	-	-	-
Portage St Bridge		34	-	-	-	-	-		-	-	-	-
Portage St to S Pitcher		25	-	-	-	-	-		-	-	-	-
S Pitcher Bridge		25	-	-	-	-	-		-	-	-	-
Pitcher to RR Bridge 2	200	25	0.11	3.5	648	741	972	200	200	29.17	1,001	29,830
RR Bridge 2		25	-	3.5	-	-	-		-	-	-	-
RR Bridge 2 to RR Bridge 3	405	25	0.23	3.5	1,313	1,500	1,969	405	405	59.06	2,028	60,000
RR Bridge 3	30	25	0.02	3.5	97	111	148		-	4.38	150	4,444
RR Bridge 3 to RR Bridge 4	125	25	0.07	3.5	405	463	608	125	125	18.23	626	18,519
RR Bridge 4		25	-	3.5	-	-	-		-	-	-	-
RR Bridge 4 to E Michigan	125	10	0.03	3.5	162	185	243	125	125	7.29	250	7,407
E Michigan Bridge		30	-	3.5	-	-	-		-	-	-	-
Michigan St to Confluence	50	15	0.02	3.5	97	111	148	50	50	4.38	150	4,444
	2365		1.45		8,509	9,682	12,763	1,555	2,145	392.89	13,146	397,267

10 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)	Total + Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (sf)	Site Restoration (lin)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
Alcott St to Bryant St Bridge	388	20	0.17	0.5	136	273	204	388	388	6.13	211	10,904
Yant St Bridge			-	-	-		-					
Yant St to Reed Ave			-									
Reed Ave Bridge			-				-					
Reed Ave Bridge to Reed Ct Bend	175	10	0.04	0.71	46	78	69		-	2.07	71	3,137
Reed Ct Bend to RR Bridge 1			-				-					
RR Bridge 1			-				-					
RR Bridge 1 to Stockbridge			-				-					
Stockbridge Bridge			-				-					
Stockbridge to Lake St	200	15	0.07	3	333	389	500		-	15.00	515	15,556
Lake St Bridge	46	20	0.02	3	102	119	153		-	4.60	158	4,770
Lake St to E Crossstown Pkwy	454	25	0.26	3	1,261	1,471	1,892	454	464	56.75	1,948	58,852
Crossstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	389	444	583	100	100	17.50	601	17,778
Crossstown Pkwy to E Vine St	390	40	0.36	3.5	2,022	2,311	3,033	390	390	91.00	3,124	92,444
Vine St Bridge	67	40	0.06	3.5	347	397	521			15.63	537	15,861
Vine St to E Dutton St	400	28	0.26	3	1,244	1,452	1,867			56.00	1,923	58,074
Dutton St Bridge		33	-		-							
Dutton St to Walnut St	50	37	0.04	3	206	240	308	50	50			
Walnut St Bridge		42	-		-							
Walnut St to Portage St		42	-		-							
Portage St Bridge		34	-		-							
Portage St to S Pitcher		25	-		-							
Pitcher Bridge		25	-		-							
Pitcher to RR Bridge 2	220	25	0.13	4	815	917	1,222	220	220	36.67	1,259	36,667
RR Bridge 2	30	25	0.02	4	111	125	167	30				
RR Bridge 2 to RR Bridge 3	675	25	0.39	3	1,875	2,188	2,813	675	675	84.38	2,897	87,500
RR Bridge 3	30	25	0.02	3	83	87	125	30		3.75	129	3,869
RR Bridge 3 to RR Bridge 4	150	25	0.09	3	417	486	625	150	150	18.75	644	19,444
RR Bridge 4	30	25	0.02	3	83		125	30				
RR Bridge 4 to E Michigan	300	30	0.21	3	1,000	1,167	1,500	300	300	45.00	1,545	46,667
Michigan Bridge		30	-	3			-					
Michigan St to Confluence	150	51	0.18	3	850	992	1,275	150	150	38.25	1,313	39,667
	3835		2.38		11,322	13,146	16,983	2,947	2,757	491.48	18,674	511,230

5 PPM PCB REMOVAL CHECK												
Location	Stream Distance (ft +/-)	Stream Width (ft +/-)	Surface Area (acre)	Est Ave Sediment Depth (ft)	Est Sediment Volume (cy)	Total+ Overdredge (cy)	Est Mass (tons)	Clearing For Mechanical Dredge (sf)	Site Restoration (sf)	Agent Blend Amt (ton)	Est Disposal Mass (ton)	Est Free Water Generation (gal)
E Alcott St to Bryant St Bridge	368	20	0.17	0.5	138	273	204	368	368	6.13	211	10,804
Bryant St Bridge			-		-		-					
Bryant St to Reed Ave	300	10	0.07	0.5	58	111	83	300	300	2.50	86	4,444
Reed Ave Bridge			-		-		-					
Reed Ave Bridge to Reed Ct Bend	300	10	0.07	0.71	78	134	118		-	3.55	122	5,378
Reed Ct Bend to RR Bridge 1			-		-		-					
RR Bridge 1			-		-		-					
RR Bridge 1 to Stockbridge			-		-		-					
Stockbridge Bridge			-		-		-					
Stockbridge to Lake St	931	15	0.32	3	1,552	1,810	2,328		-	68.83	2,397	72,411
Lake St Bridge	46	20	0.02	3	102	119	153		-	4.60	158	4,770
Lake St to E Crosstown Pkwy	980	20	0.45	3.5	2,541	2,904	3,811	980	980	114.33	3,825	116,148
E Crosstown Pkwy Bridge (2 x 6 ft corrugated)	100	30	0.07	3.5	389	444	583	100	444	17.50	601	17,778
E Crosstown Pkwy to E Vine St	390	40	0.36	3.5	2,022	2,311	3,033	390	390	91.00	3,124	92,444
E Vine St Bridge	67	40	0.06	4	397	447	596			17.87	613	17,887
E Vine St to E Dutton St	400	28	0.26	4	1,659	1,867	2,489			74.67	2,564	74,667
E Dutton St Bridge		33	-		-		-					
E Dutton St to Walnut St	50	37	0.04	4.5	308	343	483		50			
Walnut St Bridge		42	-		-		-					
Walnut St to Portage St		42	-		-		-					
Portage St Bridge		34	-		-		-					
Portage St to S Pitcher		25	-		-		-					
S Pitcher Bridge		25	-		-		-					
S Pitcher to RR Bridge 2	220	25	0.13	4	815	917	1,222	220	220	38.67	1,259	38,667
RR Bridge 2	30	25	0.02	4	111	125	167	30				
RR Bridge 2 to RR Bridge 3	675	25	0.39	3.5	2,188	2,500	3,281	675	675	98.44	3,380	100,000
RR Bridge 3	30	25	0.02	3.5	97	111	148	30	30	4.38	150	4,444
RR Bridge 3 to RR Bridge 4	150	25	0.09	3.5	486	556	728	150	150	21.88	751	22,222
RR Bridge 4	30	25	0.02	3.5	97	111	148	30	30			
RR Bridge 4 to E Michigan	400	30	0.26	3.5	1,558	1,778	2,333	400	400	70.00	2,403	71,111
E Michigan Bridge	87	15	0.03	3.5	169	183	254					
E Michigan St to Confluence	250	51	0.29	3.5	1,863	1,889	2,479	250	250	74.38	2,554	76,556
	5804		3.14		16,413	18,942	24,618		3,783	707.70	24,298	728,811